All You Wanted
To Know About…

Intellex® v3.2
Digital Video Management System

But didn't know what to ask.

Contents

General

Intellex® v3.2 is the newest release of American Dynamics' flagship DVR product. The operation and usability of Intellex® v3.2 is an improvement over its v3.1 predecessor. New features include enhancements to dome control and text handling. Intellex Archive Manager and Intellex Policy Manager will be of value in larger installations for data backup and Intellex security. Intellex IP is a first step in a growing demand to use IP cameras and domes.

With these improved capabilities, Intellex remains the leader in digital storage among DVRs that record up to 16 cameras in a single box. When used in conjunction with Network Client, Intellex gives you the ability to change setup parameters, control domes and review both live and recorded video, text and audio remotely.

Our general design philosophy is to keep products as simple as possible to operate. By nature, Intellex is a complex device. The complexity increases with the array of options. The mouse-driven graphical user interface (GUI) and intuitive pulldown menus follow Windows® convention and have been made as simple as possible while maintaining a wide range of functionality. Computer people love it. Non-computer people love the ability to use the product without a keyboard.

How to use this book:

This document is the latest in a series of practical product guides designed to provide real world insight into product value. It is an updated version of the v3.1 document. Changes are limited to explanations of the updated features and functions of version 3.2. The rest of the text remains essentially the same as the previous version. This manual is separated into categories. It is not intended to be read from front to back cover, although you are encouraged to do so for a general overview of the product. This is a basic reference manual for Intellex version 3.2. Although sprinkled with technical information, it is a practical overview of features that could be valuable to know during the sales and application process. Each category starts with a definition of the category. The content provides practical information on each facet of Intellex v3.2. Frequently asked questions (FAQs) are included. The intent is to explore each category in a direct manner, in as few words as possible. It indicates the good, the bad and the ugly. After reading this document, you will likely agree that there is much good, little bad, and only a rare ugly. Although "bad" and "ugly" are not historically good things to discuss with sales prospects, this information is important to know and may keep you from selling the product into the wrong application. The "good" information may help provide alternate solutions to the customer's application.

Read the document in its entirety, if you can. Keep it as a reference for Intellex v3.2. When you know that a customer has a particular interest in a certain feature of Intellex, make sure you review that item before talking with the prospect.

What's New in Intellex v3.2?

For those of you who are already familiar with Intellex, this new feature summary may be all you need to know to get up to speed. Some of the changes are minor. Some are significant improvements in the product. Let's walk through what you will run into as you work your way through the menus.

Enhanced Text Capability: Improvements have been made to text handling. Text exceptions and receipt definitions are on different menu pages. Text exceptions can be applied as a group, requiring all conditions to be met.

Enhanced Security: Intellex and Network Client support advanced security made available with Intellex Policy Manager. Intellex Policy Manager software, which is purchased separately, extends Windows-level security to Intellex. This is especially appropriate for networked systems where the IT professionals want to control the security of all network devices including Intellex. The standard Intellex security method is retained as the default. It is referred to as "classic security." Intellex Policy Manager had a limited release with Intellex v3.1. The updated version will see expanded use with v3.2.

Intellex Archive Manager: Network storage will be available with the introduction of Intellex Archive Manager. Intellex Archive Manager software is purchased separately and allows Intellex units to archive video to a network attached storage (NAS) device on a separate network server. Network Client provides access to the stored data.

Intellex Archive Manager and Intellex Policy Manager are highly valuable to the large networked installations. Both options require additional equipment that would not be practical for small installations. Each requires its own network server. Either program may be used alone or together in the same installation.

DVD Option: Want to export larger video files? You can opt for a DVD instead of a CD-RW. Intellex will export DVD-sized data (up to 4.7 gigabytes or GB) in a single session. The same DVD will also write to CD media for smaller clips.

New Hardware Configurations: 250 GB drives are used in v3.2 providing internal options of 250, 500 or 750 GB capacity. The 750 GB capacity is only available in the Intellex rack mount configuration. The standard software package has been discontinued. Deluxe and premier software packages are the remaining options.

Direct Dome Control Enhancements: Improvements have been made in direct dome control from Intellex. The Camera Control GUI has been updated to incorporate additional features. You can set presets and patterns as well as call them from Intellex. You can enter the Dome Control menu to set up dome features.

USB-to-SensorNet Direct Dome Control: Direct dome control has been improved to include SensorNet control of domes using a new USB-to-CCTV converter box, which is purchased separately. This device has both SensorNet and RS-422 outputs, however only SensorNet is used in this release. Combining this control method with the additional direct dome control enhancements mentioned above provides a powerful method for controlling all dome features.

VM96 Switcher Control: You will be able to control domes connected to VM96 switchers. Intellex control of the VM96 is similar to setup and control of AD switchers (MegaPower™ 1024, MegaPower 168 and 48 Plus). Select the control handler in the Intellex Camera Control menu. Connect a serial port to the switcher. See the manual or the "All You Wanted to Know about DVR Dome Control" document for installation details.

Network Client Enhancements: Network Client has been enhanced to accommodate the changes in Intellex. The Network Client database has been improved with Site Trees that make it easier to identify data from selected Intellex units in larger installations. Alarm notification has been improved to include notification when an Intellex hard drive is no longer functioning properly. The maximum "raw" video file size download from Intellex or NAS is no longer limited to 1 GB. Requests for video content that exceed 1 GB can be met by chaining 1 GB file packets together. Each chained packet will create a separate file. The raw file size has a maximum size of 1 GB but can be selected to a smaller size for ease of transportation by putting it on a CD or ThumbDrive. This new functionality allows the end user to download any size of video content in a single operation.

Intellex IP: Last on this list but soon to be first in many hearts is Intellex IP. This is a new hardware configuration using the same Intellex v3.2 software as the standard Intellex. Although Intellex and Network Client operation are essentially the same, the video delivery method is more advanced. IP (Internet Protocol) cameras are used to provide a video signal delivered via TCP/IP (Ethernet) to the new hardware ("1U" server). There is no coax cable in sight! At least that's the theory and will be true eventually as this technology overtakes standard cameras. Meanwhile, existing applications will be upgrading to IP with a combination of IP cameras and IP encoders that allow customers to connect their standard analog cameras through Ethernet.

Live Video

Live video is displayed directly on the monitor from video sources connected to the camera inputs of Intellex. This can be directly from cameras, looped through other devices in the CCTV system, or from any standard video source.

Intellex v3.2 accepts video from any standard video source. NTSC and PAL versions are available with eight channel (DV8000) and sixteen channels (DV16000). Live video is displayed at 800x600-pixel full screen resolution. The unit performs time base correction, so there is never a roll as images sequence. Live video may be displayed on the SVGA (computer) monitor and on three composite (TV) monitors. One composite output provides a full screen display of live video in full screen, 2x2, 3x3 and 4x4 cameos (without the GUI). This same output may be menu-selected to show the playback video or stay live when the main SVGA monitor is playing back. The second composite output is a call monitor that provides a real-time display of individual cameras. The third composite output is a duplicate of the SVGA display (available on DV16000 only, it is provided by the same video card that provides the main display). All displays are available at the same time. Combinations of these individual displays are valuable in a variety of applications.

The multiplexer front-end processes live video and displays it on the monitor at a switch rate of 120 images per second or ips NTSC (100ips PAL). Under normal conditions, the update of each individual camera is dependent on the number of cameras being used. For example: 120ips NTSC (100ips PAL) divided by 10 cameras would provide twelve updates of each camera per second (10 PAL). You can describe this as follows: Live update speed is 120ips NTSC (100ips PAL) divided by the number of cameras used.

Intellex increases the display speed of those cameras that are in alarm mode. The result is a smoother update of the cameras that are most important at that time. A single alarmed camera is interleaved (updated as every other image). This provides a near real-time update of a single camera in alarm (normal sequence is 1, 2, 3, 4…; with #5 in alarm, the sequence is 1, 5, 2, 5, 3, 5 and so on). With more than one camera in alarm, motion groups are formed (1, 567, 2, 567, 3, 567, etc.). Essentially, during an alarm event more images are provided from the most important cameras.

We traditionally think of the video input as a security camera, however it can be any composite video source. For example:

> You might have important video on a VCR tape. You could connect a VCR or camcorder as a video input to Intellex, play back the recorder tape and record the action on Intellex, then select, enhance and save that perfect image to diskette. From there it's into your PC, then attached to email and sent through the Internet to the home office. Or the same tape could be viewed as live video at the corporate office using Network Client. If you want to select your image from full motion video, just deselect or disconnect the other cameras temporarily. The remaining single input will have 30ips NTSC (25ips PAL) available.

Want to evaluate your golf swing? Just videotape yourself hacking away. Install the camcorder or VCR as described above and you are ready to single step forward and reverse to your heart's content. Don't forget to keep your head down.

Q. Tell me about these four monitor outputs.

A. **The SVGA (computer) main monitor** allows access to all live, review and GUI functions. If this is the only monitor you have, you can still see everything.

The composite duplicate of the SVGA display output (composite output of video card, DV16000 only) is good for driving a large display and will allow a composite output of reviewed video that can be transferred to videotape. Even though we are in a digital world, VHS tape will be the generic media for the

immediate future. This output is rarely used since the introduction of playback capability from the VACD (live video output).

The live video output (BNC connector on back of unit) displays the video portion without the GUI. You can view full screen, 2x2, 3x3 and 4x4 displays. The cameos and the full screen images update at the time divided rate. This display will also show playback video when menu-selected. This is a convenient place to provide a composite playback image to a VCR or other recording device. Alternately, you can export video clips along with audio and text to a CD. See the "Getting Video In and Out of Intellex" chapter on page 23 for more information.

The call/spot monitor output (BNC on rear of unit) displays real-time updates of full size images. In the call mode, it stays on the selected camera. In the spot mode, it switches to an alarmed camera for the alarm duration and then returns to the originally selected camera. Multiple alarms will sequence.

Q. How does Covert Camera affect recording?

A. Covert cameras are recorded based on the setup parameters. The only difference is that you will not see the covert camera(s) on the live display or on playback unless you enter an appropriate password, in which case you will also have access to changing their parameters on the Setup menu.

Playback Video

Playback video is the video that is retrieved from the hard drive and displayed on the main SVGA monitor. The played back video may also be seen on the composite duplicate of the main display and on the VACD card output when menu-selected to do so. Playback video appears to have a lower resolution than live video due to the configuration of JPEG. It may be accompanied by a single channel of recorded audio and up to four channels of recorded text.

Intellex has a distinct advantage over VHS tape. Although a video clip is often shown to identify the culprit, most tape investigation consists of individual image-by-image review of the tape using the pause/still button in conjunction with the single step capability of the VCR. Many still images exhibit "tearing" where the still image is jumping and portions of the image may be distorted. There is no tearing with Intellex. Each image is a perfect individual picture. The mouse-controlled Intellex jog shuttle (or selectable VCR control buttons) allow you to run forward and backward through the available images. The action gets faster or slower with no image distortion. There is no comparison between the quality of Intellex single step image review and that of a conventional VCR. In fact, if you would like to try an experiment, check the "Getting Video In and Out of Intellex" on page 23 for information on how to play back that VHS tape in Intellex.

Playback from DAT tape: You can't play back archived information directly from a DAT tape. The archived information must first be loaded into the Intellex and then reviewed from the hard drive. The reloaded information is put on the C: drive. This is the system drive partition of the first Intellex drive. It is not loaded to the data drive, as that would interfere with the normal recording. You can't load the entire DAT tape to the drive. There is not enough room, and it would take a very long time to load. Up to fifty 20 MG segments can be loaded at the same time. There is an index header on the DAT tape. You can select the segments you wish to load by time/date and whether there are alarms present. Loading and restoring information from the DAT tape can be a very slow process. The DAT is a linear device. If you select a segment for review from the physical end of the tape, the mechanism must work its way to that position before retrieving it. Once this data is reloaded to the C: drive, it can be exported to CD-RW.

Intellex v3.1 and beyond will support archiving to a Super Digital Linear Tape (SDLT) device. Although more reliable and larger in capacity than DAT, this is a tape device with many of the same limitations. SDLT devices offer an expensive archive alternative for those whose application demands permanent archive storage of all data.

The export feature of Intellex allows you to write selected video clips, along with audio and text, to a CD-RW. Intellex v3.2 has an optional DVD for exporting larger video segments. As you are viewing video in Intellex, select the start point and the end point of the desired video clip. You can include footage from one camera or from all cameras simultaneously by choosing either a single or multi-pane display. The clip is saved to a list. You can export any or all of the clips to CD. You can also fill the CD with the latest video from all cameras by activating a contact closure on alarm input 18 or by selecting the "Fill CD" option from the Export menu. Here's how you do it:

1) Close the contact.
2) Intellex calculates the last 600 MG of record time and then copies it to the CD, ending at the time the contact closed (this could take up to an hour to finish). If a DVD is used, the last four GB of information are recorded. Intellex Player software is copied to the CD along with the video for installation and viewing on a standard PC.

The jog shuttle is usually a favorite feature of Intellex playback. You can manipulate your way through the recorded video by moving the shuttle knob with the mouse. Believe it or not, there are some people who would rather have traditional VCR control buttons to review the video. If you must, you can change the jog shuttle display to traditional VCR control buttons by selecting it in the Display menu.

Q. Why does live video appear to have a higher quality than playback video?

A. Live video is processed and displayed prior to recording. It is not compressed like recorded video is. The live display pixel format is 800x600. JPEG recording limits the pixel count to 640x240 (80x30 tiles, 8x8 pixels within each tile). It is degraded even more in the lower resolution that accompanies extended record mode (320x240, DV16000 only). Although the playback video is sampled at the 800x600-pixel format for display, it is sampling the stored JPEG image.

Q. Is the playback quality really better than a high quality VHS tape? What about SVHS?

A. The earlier versions are at least as good as high quality tape. This is true the very first time you review the video. It is even truer after the 20th time you review the video. Unlike with VHS and SVHS tape, the quality of the Intellex retrieved image does not degrade with multiple usages. The cruel truth is that video quality is subjective.

Q. What about degrading quality of the video retrieved from the DAT tape? After all, it is still a tape.

A. The DAT tape stores the information in digital format. Even though the quality of the individual ones and zeros may degrade over multiple uses, they are still easily recognizable as ones and zeros by Intellex. That is why when Intellex processes the video information, the playback quality remains constant.

Q. Wouldn't it be easier to review archived information if you made the Intellex capable of reviewing information directly from the DAT tape?

A. No. DAT operation is very slow because the mechanism has to forward and reverse its way to portions of the tape that hold the information that you want to review. Once the information is on a hard drive, it is much easier and faster to get to.

Q. How can I select video for review?

A. You can review video that you just saw live by clicking the pause/play button and dragging the jog shuttle directly to the recent event. For video recorded some time ago, you can search by time/date, camera number, the playback slide bar and by Smart Search. Archived video can be reviewed by first retrieving the appropriate segments from a DAT tape, then using the search tools.

Q. What about this 320x240 record mode? Will the video quality be good enough?

A. It would depend on your expectations. It won't be as good as 640x240. It would be a good tradeoff for a longer record duration in many applications. This option is available only in the DV16000.

Q. How much will the 320x240 record mode degrade the perceived image quality?

A. Clearly, there will be a difference. The choice presented to the DV16000 user is one of longer record duration at a lower image quality or prettier pictures for a shorter time. The DV8000 user doesn't face this choice, as the 320x240 record mode is not available. Having said that, how can you mitigate the effect? The playback image from a properly placed high quality camera is not that much different in 640x240 than it is in 320x240. Lower quality cameras covering a larger viewing area will look worse. So use good cameras rather than depending solely on the zoom function within Intellex to help identify an object or person.

Q. If I record at 120 images per second (ips), will I be able to play back at 120ips?

A. The 120ips record rate is sampling cameras at that rate. No individual camera will update that fast. In fact, a single camera will not exceed 30ips as only one field is used from each camera. The actual record speed depends on the settings selected in the Rate menu (go to the Setup menu and select Rate). You can select individual camera record rates or use the traditional "auto" mode that divides the available rate of images per second across the cameras connected.

Instant Replay

Instant replay is the ability to replay incidents seconds after they happen. It allows in-depth investigation of recent events without affecting the recording of current activity. This is an easy feature to overlook when touting Intellex strengths yet very few competing products can do this. Most take minutes before the recorded video is available for playback.

The operator catches a glimpse of something on the monitor from the corner of his eye. Did that customer really put something under his shirt before hastily heading toward the door? Does he alert the front door and have the customer detained on the chance that he's right? Does he embarrass the customer, the store and himself when he finds that the customer was merely adjusting his back brace?

With VCR technology, you have to make that choice. By the time you review the tape, not only has the shoplifter cleared the parking lot. The milk in your refrigerator has probably expired. And while you are struggling to review the incident, you're not recording current activity.

With Intellex, you press the play/pause button and use the jog shuttle to replay the incident seconds after it happened. You clearly see whether the incident requires action. In the mean time, Intellex continues to record the current activity. If you have a live composite monitor installed, the live display is still visible while you are reviewing the incident on the computer monitor. So you know in advance whether you have a shoplifter deserting the scene or a customer who just remembered an important errand.

Q. You said you could review video "seconds" after it happens. How many seconds?

A. About five seconds. Actually, it depends on which mode the Intellex is in immediately before you use the mouse to activate the pause/play function. It could be as few as one second. Five seconds is a safe number to mention. You see an incident, then evoke the pause/play function to enter playback mode. The Intellex changes modes and displays the playback video. The playback video continues to display, just a few seconds behind live video. With a composite live monitor available, you could leave Intellex in this mode, taking a second look at all video from that camera first on the live, then on the main monitor.

Q. How can you demonstrate instant replay and show that the Intellex is still recording current activity while this is going on?

A. Select an object as a prop. While standing in view of the camera, toss the object into the air and let it rotate slowly while in the air. Repeat this a couple of times. Hand the object to someone else and have them continue to toss the object. At the Intellex, press play/pause and reverse the jog shuttle to your performance. You can show the object in forward and reverse with single step investigation. Next, you can fast forward to the second performer. Remember to point out that this was recording while you were playing back the previous video.

Q. What's the difference between instant replay and normal playback image review?

A. Both are reviews of video information on the data drive. The only difference is that instant replay is an immediate interaction to view a near current event. This is a vast improvement over performing a similar operation with VCR technology, which is much slower and more laborious. Few digital recorders allow instant review. This is an Intellex strength.

Pluses: • Allows immediate review of events.
- Provides the operator with an interactive connection with Intellex. You aren't just watching the action, you're part of it.

Minuses: • None, other than it is such fun to play with that the operator may get preoccupied with the technology rather than maintaining vigilance.

Smart Search

Smart Search is the trademarked term used to describe the Intellex ability to retrieve information from an existing database via search criteria. This can be by time and date, by time span or, most importantly, by selecting a motion filter that will retrieve images with movement in the selected area. Smart Search is an available option on the DV16000 and DV8000.

Smart Search was pioneered with Intellex. The importance of this feature must be stressed. With Intellex, you can also search for recorded text information. Smart Search motion exception tools provide additional filters for speed, size, direction and object size.

With all earlier storage techniques, particularly VCR technology, searches are based on information that has been imbedded in the recorded information. This typically includes time and date, camera number and perhaps an alarm indication, all of which are recorded along with the video. When a search is made, the VCR looks for the encoded information. Once this is located, you review the video associated with this information. These limited search capabilities are available with most devices.

The real problem surfaces when there is an incident that requires review and there is no camera directly in view and no alarm associated with the issue. When someone steals your laptop from your desk because you forgot to take it home with you, you sure wish you could go back and install some kind of an alarm device that could be used to search with. You may know that the culprit had to exit through a particular hallway or a particular exit door. Or that at least one of several exit paths had to be used. With VCR technology, your only alternative is to review the tape from end to end until you see someone in one of the suspected areas. Good luck.

The great thing about Intellex is that you can go back and install that alarm device to apply to video recorded before the incident happened. How can this be, you ask? The Smart Search capability of Intellex allows you to select a search filter grid in the appropriate cameras and "find" all the images where someone entered the area. Select the grid, click on Find with your mouse and a list of "matches" appears. Double click on each of the matches in that list to review the associated video.

The important thing to emphasize is that traditional alarm information must be encoded in the database (VCR tape) before the fact. With Intellex, Smart Search criteria can be selected after the fact. Just like magic!

Here is another illustration of the Smart Search capability. Again, let's compare Intellex to the VCR.

Step #1: We'll set up a camera viewing a wall with a picture hanging on it. We will connect the same camera to a VCR and to an Intellex. When we arrive the next morning, the picture is missing. It was there yesterday, now it is gone. To investigate the incident with the VCR, we fast forward back and forth until we find the place in the tape where the picture was removed. With Intellex, we select a motion grid pattern over the picture and click Find, producing a list of incidents for review. Intellex saves you a little time, but not very much.

Step #2: On the other side of the wall where the picture hung is an office. We move the picture to the side of the wall that is interior to the office. The office has a single doorway as access. The camera views the now-blank exterior wall and the doorway leading to the office with the picture inside. The next day the picture is gone. Now what? With the VCR, you have to review the tape from end to end to see when someone entered the office and exited with the picture. This could take an extraordinary amount to time. Whatever you do, don't let anything distract you because you may miss that few seconds of action.

With Intellex, we do the same as before: select a motion filter, this time over the doorway. Click Find and you've caught the culprit. No need to endure the tedious reviews associated with VCRs. So you can see that Smart Search is of less help in some applications but extremely valuable in others. In fact, the user will probably start doing "what ifs": "What if I select a filter over the employee entrance and search for those

who enter after the eight o'clock start time?" "What if I want to see if anyone entered the off-limits storage room lately?" Big Brother is here. Hopefully, he is wearing a safety uniform.

Q. Is Smart Search exclusive to Intellex?

A. The ability to retrieve selected information based on movement in the video image is based in our proprietary compression algorithm. Few of our competitors have figured out how to do this yet. Standard compression techniques do not have this capability. Some of our competitors are using the term "Smart Search", however, and probably with a different meaning.

Q. Why is Smart Search considered such a valuable tool? Can't I get effective results using properly placed alarm devices?

A. You could do a pretty good job using a multiplexer and alarm devices. The limitation is that you have to have all the pieces wired in place – actually wired in the right place and not tampered with by the perpetrator. Smart Search is tamper proof. In fact, there is nothing to tamper with. You put it there after the culprit is gone.

Q. Is there an easy way to move around within the database? For example, I have four entry doors. I'd like to check the video of these doors at the end of each day. The search-by-time feature is great; however, it takes eight separate setups to check the start and end times for arrival, breaks and lunch. Help.

A. You'll like our playback slide bar feature. As soon as you select playback, the slide bar is visible below the video image. Just grab the slider with your mouse and drag it through the database. The appropriate video is visible as you peruse the database.

Q. How about text search?

A. Text search is performed as an alphanumeric search string. Select any word string or even just a single word like "void." All text entries containing the word "void" are listed. You can select and play every single entry to see the associated video.

Q. Can I search text by time?

A. Intellex time stamps each text transaction as it is received. Intellex searches text by time and date using this stamped date. It may not match a date imbedded in the text string. If you want to search a transaction entry by the time and date printed on the transaction, do it as an alphanumeric search (for example: 3/15/02 10:37:09).

Pluses: • A timesaving and efficient tool.

Minuses: • None.

IntelleCord®

IntelleCord is the trademarked term used to describe the ability of Intellex to record only when an alarm is encountered. This includes the ability to provide up to five minutes of pre-alarm video (as well as text and audio, if applicable) from the affected cameras. The general industry term for this function is event recording.

Event recording is possible with VCR technology. The results, however, are not as impressive as they are with Intellex. The drawbacks of VCR event recording are typically well known; however, it doesn't hurt to mention them as a baseline for comparison. The general application: VCR sits idle to both conserve tape and to limit the amount of information to review. When an alarm is encountered, the VCR starts to record the event. After a specified amount of time, the VCR goes back to the idle mode, awaiting the next alarm. The advantage is that only important information is recorded, simplifying the review process.

An idle VCR takes several seconds to come up to speed. On average, you will see black and white in about three seconds and stable color after about eight seconds. This delay is acceptable in some applications. If not, you can use a VCR with an event record mode. Actually, any time lapse VCR could be used in this manner. For instance, a 960-hour mode can be used normally. The tape would last for forty days at this speed. Typical event modes are a longer duration, usually 60 and 90 days. This mode keeps the VCR heads engaged. This allows the VCR to spring into action in about one second, rather than eight seconds. Playback can be odd with short slow update periods interspersed with real time recording. The event modes still have to move the tape; otherwise, the heads would burn the tape. So, event mode works with VCRs but it isn't perfect and you won't get any pre-alarm information recorded. Wouldn't it be great if someone could overcome all the tape-related problems, like the record delay and the choppy video caused by the slow/high speed recording? And can they show us what happened right before the alarm activated the recording to begin?

Enter IntelleCord, intelligent event recording. All the tearing and delay in recording with VCRs is non-existent with Intellex. Each individual picture is a perfect image. How do we meet that pre-alarm requirement? Just imagine what we are asking the Intellex to do, start recording before it starts recording. Yes, we can do that!

How? Intellex continually records up to five minutes of information from each camera and then, unless told to do otherwise, dumps it. This is a FIFO (first in first out) arrangement, stored in a file on the system drive. The newest information continues to write over the old until an alarm is encountered. The data drive starts recording the alarmed camera immediately while the information in the FIFO buffer is copied and attached to the beginning of the alarm video. You now have the video of the event and video of what transpired before the event occurred from the same camera.

Q. Let me get this straight. I can get recorded video from a camera prior to an alarm even though I wasn't recording at the time? How about text and audio?

A. Yes, using the FIFO buffer technique mentioned above. Simply go into the custom schedule screen to set up the alarm mode for each camera. You can select the pre-alarm duration – choose 0, 15, 30, 45 or 60 seconds or 2, 3, 4 or 5 minutes. You can also apply a live filter and specify the level of quality, sensitivity and resolution that you want for recording video associated with an alarm event. See the "Installation and Configuration Guide" for Intellex v3.2 for step-by-step instructions. Text and audio are available as well, assuming they were associated with the camera.

Q. When I play back the event, how will I know whether the video is from before or after the alarm was triggered?

A. The status line will indicate pre-alarm or motion detection.

Q. How valuable is pre-alarm video?

A. It depends on the application. If you are viewing an empty room with an alarm triggered as someone enters, the review will consist of up to five minutes of an empty room followed by someone entering the room. This is not very interesting pre-alarm information. If, however, someone puts the barrel of a gun in the face of a bank teller, you might be interested in seeing what the culprit was doing while standing in line. So, pre-alarm information ranges from critical to uneventful, depending on the individual application.

Motion Detection

Motion detection is the ability to sense movement in a video image and provide a usable output. Motion detection in Intellex can cause an idle system to begin recording and provide predetermined alarm outputs.

In Intellex, it's based on changes in the color content of the image. Differences are detected at the pixel level. Based on these changes, we make intelligent decisions as to whether we want to include these changes as motion detection. How much do the pixels have to change before we include that tile in the motion detection scheme? How many tiles have to change before we include that image in the motion detection scheme? Changing the sensitivity level will vary the results.

Motion detection basics: If motion detection is new to you, you need to be aware of the pitfalls associated with motion and questions that typically arise. The truth is that motion detection is not an exact science. It all sounds good in theory. Making it work in the real world is another issue entirely. Those who make a living selling and supporting motion products have the emotional scars that come with the territory. Imagine you are demoing the product and the first question asked is, "Will this work outside?" The person asking the question probably knows something about motion detection and your answer will let them know whether or not you do. Be careful. Your credibility is at stake.

The motion detection system can't really "see" what is happening. We see a car driving through a parking lot. The motion system sees changes in the light content of the image if it is analog or changes in the pixels that make up the image if it is digital. So turning on a light could trigger an alarm even though nothing actually moved within the image. Once the basic detection mechanism is known, the challenge becomes: how can you defeat the system? The first volunteer will be the one who asked if it would work outside.

Your answer to the "Will it work outside?" question should go something like this:

"Intellex motion detection reacts to changes in the pixel content of the image. We make intelligent decisions about this content and decide whether we want a particular change to trigger an alarm. The trick is to set the motion parameters so that we ignore all changes that we don't want to cause an alarm. If we do this right, the remaining changes will be valid alarms. With the constant lighting and controlled environment that we tend to find indoors, we can expect reasonably accurate results. When you move outside, you encounter additional challenges like the wind blowing the trees and bushes and flags waving in the breeze. The light changes from day to night. Birds fly by. The neighborhood dog walks through the scene. No matter what you do, you can't keep that large insect from walking across the camera lens. Intellex will detect motion outside; however, much of the motion may be something that you would rather ignore."

Once this is said, you point out that changing detection grid sizes and sensitivity can control Intellex motion accuracy. With controlled lighting and reasonable expectations, you might even find it valuable outside at night. With any luck, the next question will be, "How do you set up motion detection in Intellex?"

How does it work? (A review of the JPEG section in this document will help in understanding this issue.)

Each image consists of 2,400 tiles. Each tile contains 64 pixels in an 8x8 matrix. The selected motion detection grid can range from a few tiles up to the entire screen. When there is a change in the pixel content of a tile beyond a selected threshold (controlled by the quality settings), this tile becomes a candidate to be included in motion detection. A percentage of the tiles selected in the motion detection grid must have movement before the image is selected to trigger a motion alarm (controlled by the sensitivity settings). Once enough tiles change, the alarm is triggered.

Things to consider:
• The larger the motion grid selected, the harder it will be to get an alarm.
• The lower the sensitivity setting, the harder it will be to get an alarm.

- The further a moving object is from the camera, the harder it will be to get an alarm.
- If an object is coming directly toward the camera, it is harder to get an alarm. If the same object is moving across the field of view, your alarm chances are improved.

Q. Why is it harder to get an alarm if all the tiles are selected? Wouldn't this make it easier to see motion anywhere in the image?

A. No. Because of the way the feature works, a percentage of the selected tiles must have movement before the alarm is recognized. It is not recommended to select the entire screen for detection, although this does work if the sensitivity is set near 100%. The high sensitivity setting is problematic, however, since the camera will induce some natural jitter that may cause false alarms.

Q. Shouldn't I lower the sensitivity to eliminate false alarms?

A. Yes, with an explanation. If you lower the sensitivity, you will eliminate false alarms. The trick is to lower it enough to eliminate the false alarms while maintaining the ability to capture legitimate alarms. This could take some testing and experimentation to find the perfect sensitivity setting for a particular camera view.

Q. Why does the distance from the camera affect the triggering of an alarm?

A. Since the alarm is based on a percentage of the selected tiles having movement, the closer an object is to the camera, the more tiles it is covering.

Q. Why are alarm chances better with an object moving across the field of view than they are with an object moving directly toward the camera?

A. Objects moving across the field of view are impacting more tiles more quickly than the same object moving toward the camera.

Q. All day, the motion detection on my outdoor cameras works great. I seem to have trouble as soon as the sun goes down. What am I doing wrong?

A. To overstate the obvious, light changes are dramatic from day to night. What might have been an adequate grid setup and sensitivity for bright sunlight may not be appropriate at night. Intellex is sensitive to graininess in the camera image because it sees this as pixel changes and will produce false alarms. If you see that the outside images are visibly grainy at night, you need to open the associated camera's iris to allow more light. But don't open it too far, as the day image will wash out. An auto iris lens is recommended for outside use. Next is the shutter speed. The higher the shutter speed, the less light admitted to the imager. Put the shutter speed as low as possible while maintaining daytime acceptability. Use the custom schedule to change the motion parameters from day to night (grid size, sensitivity). Install outside lighting for particularly difficult cameras. You could skip the outside motion at night and go with a Passive Infra Red Motion Detector (PIR).

Q. I went into the motion setup screen and selected all the tiles. I counted them and found that the grid is 78 by 28 rather than 80 by 30.

A. You are correct. The JPEG image is subdivided into 2,400 tiles in an 80 by 30 grid. We do not utilize the perimeter tiles, as the edges of the image may be unstable. So, the motion grid is 78 by 28.

Pluses: • Versatile motion setup parameters.
        • Schedule setup allows motion to be activated at various times.

Minuses: • Because motion detection is not an exact science, false alarms may occur.

Motion Exception

Motion exception is not motion detection. It is neither better nor worse than motion detection. It is just different and may be used as an adjunct to traditional motion detection. We like to say how our products are easy to use. However, this is only true with motion exception once you know the rules of engagement. This feature does work. It is not perfect, but it will provide a reasonable level of success if you follow the rules below. Forget what you think you know about standard motion detection and follow these "rules of thumb."

1. Outside is better than inside.
2. Further from the camera is better than closer.
3. Faster record rate is better than slower.
4. Select as small a detection area as practical.
5. Don't increase the target size unless there is a compelling reason to do so.
6. Don't increase the target speed unless there is a compelling reason to do so.
7. Good video feeds are essential.

1. Outside is better than inside: This is different than standard motion detection. We know that lighting is inconsistent out of doors and rarely available at night. Wake most motion detection experts from a sound sleep and they blurt out, "Motion detection is useless in the dark!" We instinctively "know" that we should avoid outside cameras as much as possible.

   This is not necessarily so with motion exception. You still can't see in the dark, however outside is better than inside. Motion exception works best when an appropriate detection area is selected at the right distance from the camera. A vehicle driving through the detection area would have a relatively slow transition through the window (rectangle or oval, for example). A relatively slow hand movement in front of a camera would have the relative speed of a jet aircraft compared to the vehicle transition time. The amount of time the target is within the detection area is crucial. Motion exception compares a series of images before providing an alarm. Standard motion detection just checks the difference from one image to the next. The image record speed must be set to at least 7.5ips in order to provide enough camera updates to analyze. The faster the update speed, the easier it is to track the object in motion. So a faster update speed will allow a smaller detection area. This can be an issue depending on the camera view (trees, buildings, and so on).

2. Further from the camera is better than closer: As briefly mentioned above, a relatively slow movement near the camera "looks" faster than the same speed of movement further from the camera. A greater number of images generated while the object is within the detection area provides more information to process and allows more reliable results.

3. Faster record rate is better than slower: More updates provide more opportunity to track an object within a given detection area. If the update is too slow, the object will pass through the detection area before there have been enough images to produce an accurate track.

4. Select as small a detection area as practical: Actually, the detection area can be large or small. The background of the selected detection area is most important. Ideally, the background will have no normal movement. The only movement would be the object being tracked. A smaller detection area is more likely to avoid trees and reflections typically presented to outside cameras. You would do better with two smaller detection areas that avoid a tree in the path of a road. Remember that reflections change with the angle of the sun. Remember that the object must have a sufficient number of updates while it is traversing the detection zone. A faster update speed will allow a smaller detection area to be selected. Too large a detection area may trigger results you are not interested in.

5. Don't increase the target size unless there is a compelling reason to do so: A smaller selected target size is more likely to trigger alarms. Increasing the size and shape will eliminate alarms

from smaller and odd shaped objects. If this is your intent, like providing an alarm when a large truck backs up to a loading dock while ignoring people walking in the area, increase the size as appropriate. If you want to capture all objects crossing the area, leave the size at minimum.

6. Don't increase the target speed unless there is a compelling reason to do so: If the application calls for capturing objects moving quickly while ignoring slow moving objects, increase the speed as appropriate. You can set a different speed for each selected direction if you'd like. This would be a complex setup and may not provide the consistent results you want. Objects could move and stop within the detection area and even change direction. If the speed is consistent, you'll get better results. Can you configure the alarm to capture slow moving objects while ignoring fast moving objects? It is not intended to do that but you can try leaving the speed at zero and reduce the size of the detection area. Fast objects will whiz through before enough images are available to process. Slow objects will trigger an alarm.

7. Good video feeds are essential: As always, you can't generate information that isn't there. All you can do is make the most of the video you do have. Make sure the camera is adjusted properly. Motion exception works best when cameras have a long field of view and a steadily moving target.

Q. Can't I generate an alarm just as easily with standard motion detection?

A. Yes, you can. Standard motion detection will generate more alarms, many of which will be false alarms. Motion exception analyzes a series of image updates to more accurately discern what the "motion" is doing. So the rule of thumb would be that motion detection is more prone to false alarms and motion exception is more likely to miss alarms.

Q. How accurate is this? Can I depend on it in a mission critical application?

A. All motion detection methods are less than perfect. If your intent is to err on the safe side and allow lots of false alarms to ensure that you get the iffy ones just in case, then standard motion detection is the way to go. Motion exception may be more valuable for reviewing alarms once you find yourself deluged with the large list of alarms generated with a "loose" motion detection attitude. You might be able to cut the list in half by selecting motion in one direction. You can further fine-tune the search to zero in on the type of activity you're looking for.

Which does what?

Motion Exception	Motion Detection
Needs to analyze several images before reacting.	Reacts image to image.
Works best outside.	Works best inside.
Works best with movement farther from the camera.	Works best with movement closer to the camera.
More likely to miss alarms than generate false alarms.	More likely to generate false alarms than miss alarms.
More likely to find specific types of motion when searching.	More likely to find any type of motion when searching.
Uses specific tools to narrow alarm and search response.	Uses general sensitivity adjustment to narrow alarm and search response.
Effectiveness will be limited to specific camera views.	Can be effective on most camera views.
Not effective in low light. Will likely miss alarms.	Not effective in low light. Will likely generate many false alarms.

Alarm Options

Alarm handling describes the series of events that take place when Intellex encounters an alarm. Alarms can be generated by devices wired to the physical alarm input connectors, by motion alarms or motion exception alarms set up within Intellex, by error and warning messages produced within Intellex, by text exceptions and manually by the operator. There are 18 individual alarm inputs, one for each of the 16 camera inputs plus two others. Alarm input 17 provides a contact closure that will reset the system clock to the nearest hour (time-sync). Alarm input 18 provides a contact closure that will send the last data from all cameras to fill a CD (assuming that you have that option installed on the Intellex). Alarm outputs are provided through 16 individual wired outputs, by alarm graphics on the monitor and by altered screen formats. Alarms may cause changes in record modes, depending on selected system settings.

In effect, a lot can go on with Intellex that does not necessarily include video. This is one area that is typically ignored. An end user could have an Intellex sitting on his desk with only a few cameras attached, and then hire someone else to install devices that tell him when someone enters the lobby or when a delivery truck arrives. Why not have Intellex detect these occurrences?

You have a lot of variability to work with. The best approach is to make the Intellex match the operation of the customer's normal procedures. What does the customer want to do? What can Intellex do to accommodate this procedure? If there are discrepancies, see if minor procedural changes will be acceptable and effective. The next step is to use external devices to make up for the shortfall. If all else fails, you may have to use the word "compromise."

Wired alarm inputs: There are 16 alarm inputs, one per camera. So, how many alarm devices can you wire into an Intellex? This is a trick question. Most people answer 16. Actually, it is unlimited. You could wire 100 door contacts, in series, into alarm input number one. Any open door would trigger an alarm. The alarm inputs are looking for a TTL signal. TTL stands for transistor transistor logic. This is a very old term that refers to early digital logic devices using signals that were either zero volts or five volts. Alarm devices utilizing 0-5 volt levels (TTL) are generally available. Contact closure devices may also be used, as a grounded contact will provide zero volts to the input. The alarm inputs can be changed independently from active low to active high to accommodate different devices.

Wired alarm outputs: There are 16 individual alarm outputs (TTL type), one per camera. So, how many alarm output devices can you wire to Intellex? This is another trick question. It is not necessarily unlimited this time. Each TTL output will produce a maximum of about 25 milliamps. You could connect two or possibly three very low current requirement devices to each output. Once you exceed the output current capacity, nothing happens. So there is a limit. However, where there is a will, there is a way out. One of the connected devices could be a low input current relay that provides high current relay contact outputs capable of driving just about anything, like that massive flashing aircraft warning light and ear shattering claxon. Alarm outputs are always high active, meaning they are normally zero volts and switch to five volts (high) upon alarm.

When someone asks, "Can Intellex do this?" – whatever "this" is – the most immediate answer might be no because that particular function was not designed into Intellex. But the more correct answer might well be that we can accommodate that function with the use of external devices. There is much that can be accomplished with inexpensive switches and lights combined with a little imagination.

Motion alarms: With built-in motion detection, any camera can be set up to cause an alarm based on movement within the camera view. Using the custom schedule, you can have the Intellex automatically change the motion parameters based on the time of day and the day of the week as well as on an exception basis such as holidays.

Alarm record speed: You can set the alarm record speed or images per second independently of the normal record speed. For example, you could have the normal record speed set to 7.5ips NTSC (6.25ips

PAL) and the alarm speed set to 120ips NTSC (100ips PAL). When an alarm occurs, you get more recorded images of the more important camera. With no alarms, you are conserving disk space.

Alarm options: You can select the alarm duration (5 seconds to 5 minutes), alarm record speed (independent of normal record speed), alarm record quality, and whether or not the alarms respond to video loss.

Alarm message display: Select whether you want the monitor to display the alarm graphic and switch to multi-screen format when the alarmed camera is not currently on the monitor. This can be a crucial selection. Many customers do not want the display to go to multi-screen on alarm because they lose sight of the camera currently being viewed.

Latch messages: This maintains alarm indications after the alarm clears until the operator resets the condition. Latch messages can be valuable when an alarm occurs while the operator is out making rounds and might otherwise not realize that anything happened in his or her absence.

Unit alarm out: When selected, alarm output 16 is a global alarm output. Any alarm input will activate the individual alarm output and the global output. One connected buzzer can alert the operator to any alarm. This is especially important when Alarm Message Display is disabled. The sound alerts the operator to an alarm while the display is unaffected.

Message alert: When selected, the global output (#16) is activated every time an alarm message is displayed. This is valuable for alerting the operator that the database is nearly full and it is time to archive.

Q. Why isn't there a buzzer built into Intellex?

A. Good question. The practical solution would be to install a buzzer on the global output of Intellex. I suggest a three-dollar item from Radio Shack or Tandy: part number 273-053A. It is a 3-volt DC, 15 milliamp, 75db buzzer. This self-contained device has two wires that attach directly to the alarm connector. It is not ear shattering, but it is an attention getter. There are other voltage ranges available that would lower the sound level, or you could apply tape to deaden the sound. A small hole in the tape makes an effective volume adjustment.

Q. How do I alert the operator to alarms and messages?

A. With the attached buzzer and the appropriate selections in the program, the alert will sound with alarm inputs, motion alarms and displayed messages. A spot monitor will display the alarmed camera.

Q. Can I make several cameras go into alarm when any one of them is alarmed?

A. Not normally; however, you could wire the alarm output of one camera to be the alarm input of another. If you cross enough wires, you could accomplish almost any combination. Using the custom schedule, you can enable and disable motion alarm combinations at different times of day. If using wired alarms, you could wire through a switch and manually enable and disable. A little imagination goes a long way.

Q. I have a customer using the external buzzer to indicate alarms because the customer doesn't want to have the screen format change when an alarm occurs. Since the alarm graphic does not appear on the screen, how can the customer tell which camera is in alarm mode?

A. One option is to review the alarm list after the alarm clears. The last alarm is at the top of the list. Another option is to wire lights (LEDs) to the individual alarm outputs. Arranged in a panel, these would indicate the camera in alarm.

Pluses: • Individual alarm outputs.
                Alarm response flexibility.

Minuses: • No front panel indication of camera in alarm.

Record/Archive Options

There are different record modes, record methods and archive methods to consider with Intellex. These methods differ depending on the application.

Record mode is either **linear** or **circular.** Linear means that the Intellex will record video until the database is full, then stop. Circular means that the Intellex will not stop recording when the database is full. It will continue to record, writing over the oldest information first. The system default is linear mode with a message displayed when the database is 75% full.

Record method has three general categories. You can **record everything**, all the time. You can record using the **daily schedule** that allows you to separate the day into two different record schedules (day and night), and set different parameters for each period. You can use a **custom schedule** that allows considerable flexibility in changing record functionality. The system default is the daily schedule. If you haven't made any changes to the schedule, recording continues for all cameras throughout the entire day. So in effect, the default is to record all cameras all the time.

There are three **archive methods**: 1) **No archive** (for those who have no long term storage requirements); 2) **Archive while recording**; and 3) **Stop recording and archive everything,** which is typically done on a recurring basis. The system default setting is "stop recording and archive everything". You are prompted to select this or the "archive while recording" mode when you initiate the archive process. If you do not select an archive method or do not insert a DAT tape, the default becomes "no archive."

Archive Scheduler lets you select specific cameras to archive at pre-selected times.

What do you get if you don't do anything? You will record all the cameras all the time until the database is full then the oldest information is overwritten as recording continues in "circular" fashion. Meanwhile, nothing is being archived. In order to be more proactive than this, pick one from each column:

Record Mode:	Record Method:	Archive Method:
Linear (Stop recording when database is full).	Record all cameras all the time.	No archive.
Circular (Continue recording when database is full; write over oldest data first).	Record per daily schedule (select day and night settings).	Archive in background (continuous while recording).
	Record per custom schedule (select from: View and record, view and record only on alarm, deselect view and record).	Archive offline (stop recording and archive everything).

There are tradeoffs to consider when matching the Intellex record and archive options to the application. The following list of options shows the advantages and disadvantages of each and may be of value in determining the proper setup for each installation.

Don't leave these items in their default settings unless the application calls for those modes.

With drive sizes continuing to grow, and the Extended Storage Module (ESM) being added to the line, the need for archiving is diminishing for many customers. There was a time when a week's worth of video storage was impossible. Now that amount of storage is routine. Thirty, and even sixty days of storage are achievable with an ESM. With longer storage capacities and the ability to export video clips to a CD, fewer customers are opting for the DAT archive option.

Option:	Advantage:	Disadvantage:
Linear record mode.	Stops recording when database is full, ensuring that no recorded information is lost. Notifies operator when nearing end of database (% selectable).	Stops recording when database is full. No additional recording. Requires operator intervention to resume recording.
Circular record mode.	Continuous recording. Good for applications where hard drive storage exceeds the required data storage time.	Could record over valuable information unless operator intervenes.
Record all cameras all the time.	Everything is recorded – no lost information.	Fills drive space quickly. More information to review when an incident occurs.
Record per daily schedule.	Selective recording. Can extend record time. Different motion settings for facility's schedule (day/night operation).	Some video is not recorded depending on schedule selections.
Record per custom schedule.	Considerable flexibility in camera and time record methods.	Some video is not recorded depending on schedule selections.
Archive in background while recording.	Typical operation allows tape change on routine basis (every 24 hours, for example). Archive can keep pace with hard drive recording at both a lowered ips rate and the higher ips rate triggered by an alarm.	DAT is slower than hard drive record speed. This could result in eventual loss of some information.
Archive offline.	Allows you to archive the entire database at one time. This method is valuable when you know that a critical incident has taken place. It ensures that you get the information on DAT before anything happens to the original video.	This is a very slow process. One 20 GB DAT tape could take 5 hours to record. You would likely have multiple DAT tapes worth of data to archive. No recording is taking place while the archiving is going on.
No archive.	Good for applications where the normal record duration exceeds the length of time for which the information is needed, something that is often the case when event record mode is used. If events are rare, the on-board hard drive storage can last for a long period of time. Ease of operation.	No video is being archived for future use.

Getting Video In and Out of Intellex

Picture portability is the process of sharing the video information in Intellex with others, others being other Intellex units, individuals, police, courts and more.

Once video is stored on the Intellex hard drive, you can retrieve information in the following ways:

1. **Export to a CD or DVD:** Selected video clips can be saved to a CD or DVD. Intellex Player software is saved along with the video for easy playback on any standard PC. Alternately, you could elect to fill the CD with the most current recorded information by selecting this function in the Export Program menu or by causing a contact closure to alarm input 18.

2. **Save to a standard 3.5" floppy diskette:** From the Tools menu, you can select a single image to be saved on a diskette. This is saved as a bit map file that can be restored in any Intellex or on any PC using Paintbrush or a similar program. A bit map file is great for emailing anywhere over the Internet or showing the picture of the suspicious scene to the police.

3. **Print to a printer:** From the Tools menu, you can select a single image to be printed on a printer. This can be a high-end color laser printer or a low-end ink jet model. All you need is the printer driver to install the printer on Intellex. This allows that single image of the "smoking gun" to be shown in low tech fashion.

4. **Archive to a DAT tape:** All recorded information can be archived to a DAT tape, either in the background while Intellex continues recording or as an offline operation. A drawer full of DAT tapes can hold months' worth of video. A word of caution: tapes made on later versions of Intellex will not work on earlier versions. However, tapes made on older versions will work in the newer versions. Depending on the hardware version, the DAT drive may be internal to the system or it may take the form of an external SCSI DAT drive. Data restored to Intellex from a DAT may be reviewed and clips saved to CD-RW.

5. **Archive to SDLT:** For those who must have mass archive storage at any price, Intellex supports archiving to a Super Digital Linear Tape (SDLT). This expensive addition (about $4k) is currently limited to Quantum SDLT320.

6. **Download video to a VHS tape:** You can connect a recording device to either the video card composite output or the VACD output. You can use these outputs to record directly to a VCR and save the information viewed on the VGA screen to a VHS tape. This is great for converting our high tech digital information into a form that is more generic, which is often the first thing the police ask for when a significant event takes place. Would you like to have a recording of alarm events only on a VCR? Connect the device to the "spot" monitor output and trigger it with the global alarm output of Intellex. With the Intellex set to "spot" mode, the spot monitor switches to the alarmed camera and the global alarm output triggers recording. The result is a tape of the alarm events. The VCR will take several seconds to come up to speed unless it is recording in an event mode.

7. **Download to Network Client:** A PC running Network Client software can retrieve recorded video from any Intellex connected to the network. Network Client can retrieve live video from Intellex either through a network or as a dial-up connection.

8. **Review video directly from the hard drive on Intellex:** Not to overlook the obvious, you can review stored information directly at the Intellex.

How does video information find its way into the Intellex?

1. **Directly from security cameras:** This is the most common method. The cameras may be cabled directly to Intellex, or looped through a variety of other devices used in the CCTV system.

2. **From a standard 3.5" floppy diskette:** Images saved on a diskette from the Tools menu on one Intellex can be loaded back into the same Intellex or another Intellex. A standard floppy drive is not a powerful as it once was, but is still serves a practical purpose for saving single images or Intellex configuration data.

3. **From a DAT tape (or SDLT):** Information stored on a DAT tape can be loaded into the Intellex and reviewed. Up to 50 twenty-megabyte segments may be loaded at one time (DV16000 only). Once uploaded, the data can be exported to a CD-RW.

4. **From a VCR:** Odd as it may seem, you could run the output of a VCR or camcorder as a video input to an Intellex. You could play back this video, save an image to floppy and then send the image via email. Want to see real-time video of your recorded information? Just deselect (or disconnect) all other camera inputs. The tape will look just like TV. You will be able to single step, save and email photos to others. Don't forget to restore the Intellex cameras to their original condition when you're done. You could play the tape as a camera input while another location reviews it as "live" using Network Client. The recorded input can be downloaded, reviewed and stored with Network Client.

5. **From another Intellex hard drive:** In a pinch, you could use the database management capability in the Storage menu to add a drive from another Intellex v3.x and recover the data.

6. **From IP cameras:** With Intellex IP, the video source is delivered via Ethernet from either an IP camera or a video server that converts the output of standard cameras into TCP. This is still a new phenomenon but it's growing rapidly.

Any standard composite video input can be recorded on Intellex.

Q. How many images can I save on a 3.5" floppy diskette?

A. Just one. These images are saved as a bit map file. Bit map files are typically about 900K. The total capacity of the diskette is 1440K (1.44 MG).

Q. Will I be able to enhance the saved image in my PC using Paint or another graphics program?

A. You will be able to change the image in Paint. However, you will not have the same detail to work with as you would with a scanned photograph saved as a bit map file. The original Intellex image was in JPEG. A saved (copied) image will never have more detail than the original.

Q. Do I have to use an expensive printer to print images from Intellex?

A. The theory is that any printer with a Windows driver will work. We have tried only a few of the thousands available. You must install the printer driver software along with the printer. A very inexpensive inkjet printer gives reasonably good results.

Q. What is a VGA-to-video converter?

A. This is a marvelous device that connects to the VGA (computer monitor) output of a computer or Intellex. It converts the signal that the computer monitor is looking for into the kind of signal that the TV-type monitor requires. These have a history of being pricey devices and can cost as much as two thousand dollars. Later low-end devices are in the $200 range. The quality varies widely, usually ranging from adequate to bad. The price is not always indicative of the quality result. The last one I purchased was $649

from Black Box: Model AC334A. The picture quality is adequate. Make that adequate plus. You even get a remote control with a built-in laser pointer and microphone capability for doing voice-overs.

All Intellex v2.x units have a built-in VACD composite output. The DV16000 model also includes a composite output of the video card, which requires power up with a load attached (75 ohm resistor or monitor, for example). The VACD composite output is menu-selectable for live or playback.

Q. What about the picture quality when using a VCR as a camera input to Intellex? How good can it be and what can you do with the video when you have it?

A. If you have a good quality camcorder (all camcorders use the SP or standard play record format), and you frame the subject properly, the quality is surprisingly good. If you use a VCR tape recorded with the EP (extended play) mode, you don't have as much detail to work with. In either event, you will be able to pause and single step the images without the tearing associated with VCR technology. You won't be able to use Smart Search to find incidents.

Q. Can I use a single monitor, mouse and keyboard to control several Intellex units?

A. You can control any number of Intellex units remotely with Network Client, one at a time. The local method that allows one keyboard, monitor and mouse to control several Intellex units or PCs is a box called a KVM switch (Keyboard, Video, Mouse). Several Intellex units connect to the KVM box that connects to a single Keyboard, Video (monitor) and Mouse. KVM switches typically come in 4, 8 and 16 channel versions. Most allow up to four units to be daisy-chained together, allowing a larger number of units to be controlled from one station. Several manufacturers make these devices, including Belkin, Cybex and Black Box.

Enhancement Tools

Enhancement tools provide the ability to enlarge and modify single images selected from the database.

Enhancement tools aren't perfect. You can't create information. You can only enlarge and modify the existing information. JPEG is great for compressing images, allowing more video to fit in a smaller space. Because of the compression methods used, there is a limit to the amount of enhancement that can be done. Yet you can convince yourself of the usefulness and effectiveness of the Intellex enhancement tools by performing the following exercise:

> Connect a camera to the Intellex. Take two one hundred dollar bills out of your wallet (singles will do, too). Hold one up close to the camera. Hold the other further away. Play back the video clip and select an appropriate image to enhance. You should be looking at one bill filling about 25% of the image and the other covering five percent or so. Put the cursor over the larger of Ben's (or George's) noses and select Zoom In. Do this a couple of times and bask in the results. Return to full size and select the smaller nose. Repeat the Zoom In exercise. What did you learn? The big nose was better! Not because it is bigger but because it has more pixels to work with and you don't have to enhance it as much as you do with the smaller image to see what you need to see.

Q. What is the best way to enhance a video image?

A. This is an instance where the basics are more important than the electronics. Select the right camera position and lens to capture what you are looking for. Keep the main focus of the picture in the 25% center portion of the image. Don't depend on the enhancement tools to compensate for a single camera with a wide-angle lens that is covering a shopping center parking lot. If you can barely identify the make of an automobile in a full size shot, you won't be able to enlarge the license plate enough to read it.

That being said, Intellex enhancement tools are as good or better than any used in general security applications. With a slight enlargement, adjustment of brightness and contrast, and other minor adjustments, you can get a clearer view of the image.

Q. Why can I get a more effective enhancement of a photograph using an inexpensive scanner and software on my PC than I can get with Intellex?

A. The quality of the enhanced image is primarily dependent on the quality of the original image. That scanned photograph is saved as a bit map file. Most bit-mapped images are in the 900K+ size range. The largest key frame on Intellex is 64K, with most in the 12-24K range. Delta images (see JPEG) are in the 2-8K range. The enlarged bit map still has considerable detail. The JPEG image has less detail.

Q. So, why not use all bit map images on Intellex?

A. At about one MG per image, that's 1,000 images per GB. At a record rate of 120 images per second, that's about 8 seconds of recording per GB. Our method is closer to an hour per GB. If we were to use all bit map images, our 120 GB system would be about a 15-minute recorder.

JPEG

JPEG is an acronym for Joint Photographic Experts Group. This is the name of the original group that devised the JPEG standard for compressing video images. The original intent was to compress video in order to reduce file size for faster transfer of data.

Our proprietary, modified JPEG delta compression scheme has three major advantages:

1. We can store more video information than other methods on the same drive space.

2. Conditional refresh provides built-in motion detection.

3. Conditional refresh provides the basic search engine for retrieving information from an existing database (Smart Search).

Compressing video is a big subject that can occupy technical types in conversation for hours on end. There are several types of JPEG and a multitude of ways to compress each. What is presented here is an overview of the process to get the idea across to people with no technical experience.

JPEG separates the video image into 2,400 "tiles." There are 80 tiles horizontally and 30 vertically. Each tile contains 64 pixels in an 8x8 grid. (You can see a representation of these tiles in the motion setup screen in Intellex. Press Select All to enable the entire screen. The pink grid shows all 2400 tiles.) With this general format, you can vary the degree of compression in software. A 2 MG file containing 24 bits per pixel (16 million colors) with 20:1 compression yields a 100K file. You can compress as much as 100:1; however, so much information is lost that the decompressed and viewed image is pretty fuzzy looking. You have probably seen this type of image as the first update from "progressive JPEG" when downloading images from Internet websites. The picture is progressively displayed, building an increasingly clear image, as compared to the display of the image in a series of strips, top to bottom method. The first image is barely discernable. The image continues to update in stages until the final viewable image is presented. This is good for giving you something to watch that approximates the final view while you wait for your 28.8 modem to download the rest. JPEG was originally envisioned as a solution for transporting a single image. It didn't take long for someone to put single images together to produce motion video. Wouldn't it be great if someone could take all this variability, compress it enough to provide adequate storage for a digital recorder, then decompress it into something that provides a usable image for the security industry?

Enter our proprietary delta compression technology…

If you are using standard JPEG, you compress the image to a known size and store it. Since all images are compressed to the same size, you know how many images will fit on a certain size hard drive. Remember, you can only compress so much before you render the original image unusable. Our proprietary compression does a number of things well. (The great thing about a "proprietary" item is that if someone presses you for details, you can tell them "That's proprietary," rather than say, "I don't know.") The fact that it is proprietary is why no one can modify video clips. This is the basis or "watermarking".

We compress the image while maintaining the essence of the content. You'll be hard pressed to tell the difference in the image before and after compression. With data analysis equipment, you would see the difference; however, the human eye is very forgiving. This type of compression (pleasing to the eye with differences detectable only by analysis equipment) is referred to as "lossy." Lossy means that some of the original information is lost in the process of compression and decompression. Some compression methods are "lossless", meaning that all of the original information is retained. The downside to these methods is that they don't compress enough to be practical in our application. In JPEG, the degree of lossyness varies with the degree of compression. The trick is to compress as much as possible to lower the file size while retaining image quality. Our conditional JPEG compression algorithm does wonders in this area.

We further enhance the compression capabilities by updating only the tiles (remember those 2,400 tiles?) that have changed since the last time the image was sampled. For instance: If you are looking at an image of the road in front of a building, there is some natural motion – trees moving, flags waving, and so on. The rest of the image remains essentially the same unless there is a car driving by. The imagery of the road, sky, buildings and other stationary objects are static so there is no need to update this information on every image. Since the delta images (conditional on movement) are physically smaller and contain less information (fewer tiles) than the complete picture, we can store more images in a given size memory. How many tiles are in each delta image? It depends on the amount of motion in the image. With no cars and no wind, the deltas are small. With heavy traffic on a windy day, they will be much larger.

We start with a full image (key frame) as a reference. The next 31 consecutive images of that camera consist of delta images (delta like the Greek letter signifying change). These partial updates consist of the tiles that have changed since the last image. All are referenced back to the last key frame and built from there. The 32nd image is another key frame and we start the delta process over again. Why record a full image every 32nd update? The number is arbitrary. It could have been 16 or 64. We simply need to reset the reference every so often to assure picture accuracy.

With delta compression, the bad news is that I can't tell you how long the system will record before filling the hard drive. There are lots of variables like movement, quality setting, sensitivity setting, the number of cameras, camera adjustments and more. The good news is that I can tell you it will record longer than anyone else can. (Refer to the "How Long Will Intellex Record?" chapter on page 37).

Q. So what does JPEG mean?

A. OK, so the explanation above is hard to follow. Suffice it to say that JPEG is a video compression standard. Our proprietary JPEG allows us to compress even further. Additional benefits of our compression technique are motion detection and Smart Search.

Q. Do we really have to mention JPEG to potential customers?

A. No. It's like driving a car. You don't have to know how an internal combustion engine works to drive one. If someone asks you how the engine works you can smile and say, "Who cares? Smell those leather seats." If the Intellex customer is a technical type, he will probably sniff out that you are not. The more you know, the better prepared you are.

Q. Why does a live image look better than a playback image on Intellex?

A. Live images are processed for display prior to compression and recording. The recorded image is compressed with JPEG, which has a 640x240-pixel array. Even with this restriction, later software versions have made significant improvements in video quality.

Q. Can't you get more than 640x240 resolution with JPEG?

A. Yes, you can. Some do more and some do less. The limitation is the 8x8 pixel individual tiles and the 240 pixel vertical resolution. More tiles may be added to increase the horizontal resolution. You're stuck with 240 vertical. Adding more horizontal pixels does generate some interesting aspect ratio problems.

Pluses: • Our proprietary compression method allows substantial video storage.
          • Effective motion detection.
          • Enables Smart Search.

Minuses: • Blocky pictures.
          • Limited expansion capabilities.

Extended Storage

Extended Storage is an external device that connects to Intellex and allows video recording for longer periods of time. Physically, the device can be the size of a standard PC (RAID system) or it could be a 1U 19" rack mount device (like our ESM). Price-wise, a RAID system could be more expensive than Intellex, depending on the length of storage required. RAID devices are supplied by a third party.

Q. Why won't Intellex record for longer periods of time? I need 60 days of storage with no DAT archive.

A. Intellex record duration is limited by the size of the storage drives. Current capacity is sufficient for almost all customers. Increasing the internal drive size adds cost and all customers would have to pay the price for the few who really need the extra capacity. For those who do need the additional storage, Intellex comes with drive capacities from 120 to 480 GB. An External Storage Module (ESM) can be added providing an additional 640 GB. These capacities will likely increase as available drive sizes increase.

Larger external storage devices are available.

RAID: RAID is an acronym for Redundant Array of Independent Drives. There are several different levels of RAID devices. The key is that if one of the drives fails, the information from that device is retained in the remaining drives. The different RAID levels range from storing all information in two separate locations to using software gymnastics that distribute information on all drives so that any single drive failure will not allow any loss of data.

JBOD: Acronym for Just a Bunch of Drives. This is typically similar in appearance to a RAID system. There is no redundant capability. You just keep filling the drives as one large storage capacity. JBOD can store as much as twice the capacity of RAID systems because of the redundant nature of RAID.

Q. How important is extended storage?

A. This depends on the application. Most people want a longer record time so they don't have to bother with archiving tapes. If you are archiving tapes, the additional hardware may not be warranted. With our current configuration, we can provide up to 480 GB of internal storage. With moderate settings, .6 GB per hour (at 30ips) is a reasonable estimate of storage consumption. This will provide 800+ hours of storage. If more than 33 days of video are required or if more aggressive record settings are used, your choices are to archive the data or use external storage. One additional option to consider is the 320x240 record mode. This will provide about one and a half times the record time compared to the 640x240 mode at the expense of image quality.

With the ability to have 480 GB internal storage and up to three ESM modules at 640 each, you can eliminate the inconvenience of DAT backup. Using moderate quality settings and 30ips, you can achieve 120 days of stored video.

Want to have an Intellex with a built-in RAID system? Check out the Intellex RMS. It features Intellex outfitted with Hummer-like indestructibility in rack mount hardware and packing a RAID 5 array of six drives.

Applications

An application refers to how the product is actually used. It's how the end user uses the product to solve the problem at hand. In short, application is the use of product features to meet customer needs.

Applications are often confused with vertical markets. Some examples of vertical markets are hospitals, retail stores, warehouses and casinos. These are actually places where you would attempt to sell products. An application, on the other hand, is the manner in which the product is being used. For instance:

A chain of specialty grocery stores is using Intellex in its stores, warehouses and corporate office. Network Client is used at several of the locations to view live images from any of the other locations and to download selected video clips of suspicious activities. Several of the smaller stores are equipped with DV8000s with eight cameras attached. The larger locations have DV16000s with twelve to sixteen cameras installed.

Live video: A few of the larger stores have on-site security to monitor local activity. The attendant will monitor the store floor cameras to observe cashiers and customer traffic. Assistance can be directed to customers in apparent need. This surprises customers when the help arrives "out of nowhere." Backroom cameras are viewed to observe employee traffic. The receiving door and rear access door cameras are of primary concern. The operator uses a Touchtracker controller to position domes and change the Intellex display mode.

Local live/recorded audio: A single channel of audio is available and used to record the store public address announcements. It is later reviewed for accuracy of announcements and as a training opportunity. In some applications, a microphone is placed above the checkout counter. Here audio can be monitored and reviewed to assist in investigating an issue.

Remote live video: Live video is monitored from the corporate office on an audit basis using Network Client v3.2. The same camera views from several stores are saved as "configurations" and viewed to compare the effectiveness of similar departments in different stores. The remote operator can move the domes in the store to get a better look at activity.

Playback video: A manager at another store wants to review a recent event that he just saw during live observation. He asks the store attendant to play back the last five minutes of recorded video for camera six. He also asks that the incident be recorded to a CD and sent to him and to the corporate office. While the attendant is saving the information to disk, he reminds the manager that he can download the same clip to his Network Client database. The CD recording and the remotely reviewed information may include audio and transaction text.

Instant replay: This feature allows immediate review of recent events. The attendant thinks she saw a shoplifter in action. The instant replay feature allows for close review of the event. Meanwhile, the live display monitor continues to provide current video. Using both monitors, the attendant has a déjà vu view of the ongoing activity (live on composite, replay a few seconds later on the VGA monitor).

Text recording: Text from checkout registers is recorded along with video.

Smart Search: The attendant at one of the larger stores observes an irregularity at the cash register that he had also observed at the same time the previous day. He quickly returns to the video from the previous day to see if the same cashier was on duty in that department and to compare the transaction data. Later, a "traffic search" is made by drawing a grid near a new product display rack. Wondering what happened to all the stock of a hot item, the attendant performs a text search to see how many of the items passed through the registers.

Motion detection: A truck approaching the receiving door alerts the attendant to send assistance to receiving. The movement of a customer entering a low traffic area of the store alerts the attendant of her

presence. The attendant, in turn, notifies staff on the floor. The customer is still wondering how that salesperson appeared out of nowhere.

Alarm handling: The global alarm output alerts the attendant to important events. An employee trying to gain entry to the locked storage area triggers an alarm that activates the appropriate manager's pager. A manually generated alarm earmarks an important event for easy later review from the alarm list.

Employees are instructed to press a particular button in the event of a robbery. The button provides a contact closure to the Intellex that causes it to send recent video (including the robbery video) to a CD.

Record/archive options: The systems equipped with archive capability are set to circular record mode. These stores are archiving in the background. The DAT tape is changed every morning at 6 a.m. Tapes are kept for thirty days and then reused. The cleaning tape is run in the system every Sunday. All cameras are recorded at 30ips. The archive process is under review to determine if it is really necessary. Several of the stores have ESM modules and are recording in the extended record format (320x240) with no archiving taking place. If the record "retention" is found to be long enough, the archive process may be halted in favor of larger storage and no necessary human intervention. After a learning curve period, the recording of some cameras will likely be modified with the custom schedule.

Getting video in/out: DAT tapes provide an archived record but the DAT option is dwindling in popularity as on-board storage capacities continue to increase. Single images are often saved to floppy diskette for transfer to a PC and email to the district office. Single images are sometimes printed to accompany a written report. The export feature allows selected clips of video to be stored on a CD. The Intellex viewer software can be loaded as well, allowing video to be reviewed in any standard PC. Managers at other stores and the attendant at the distribution center view live video at will. They download clips of important video for local storage in the Network Client database. The reviewed data may include audio and text. Data archived previously on a DAT may be required for an investigation. The data is uploaded onto the Intellex unit. During playback, the data is exported to CD and the CD is handed to the authorities as evidence. Throughout this process, the data remains encrypted and secure even when on the CD.

Enhancement tools: This feature is used sparingly at the corporate office and at some larger stores to make minor enhancements to images.

The above scenario illustrates how the features covered in this document relate to a particular application. We have hardly scratched the surface of possible options. This exercise is intended to get you to think through the customer's application step by step and show how Intellex can be of value, often in previously unsuspected ways. Much additional functionality may be possible by adding a few switches and wires.

There are a couple of additional features that have not been mentioned. An ADTT16E (VM16 Controller) is used to control the dome cameras on the store floor. This also allows one operator to concentrate on the live portion of the application while another could handle the image review portion.

Q. That's a lot of stuff to think about. How would we know all this information?

A. Ask the customer, "What procedure are you using now? How would you like to change the procedure? What are your biggest headaches?" Side benefits are often uncovered.

Q. Is there a checklist of application information to consider?

A. There are a number of forms I've seen with the title, "Site Survey." These usually start with number of cameras, types of lenses, and so on. Concentrating on Intellex, we need to address the following categories:

1. Live Video: How will the operator view live video?
    Is this an attended or unattended system?
    Will a live display be required while images are reviewed?
    What special considerations are there concerning current video?

2. Record and Archive Method: What will be recorded and what are the archive requirements?
   Will all cameras be recorded all the time?
   Will the custom camera schedule be used?
   What are the archive requirements?

3. Alarm Options: How will devices and events affect system interaction?
   What visual and sound indications are required?
   Will motion alarms be used to initiate recording? What are the pre-alarm requirements?
   Will alarms take precedence over the current live display?

4. Video In and Out: How will the customer use the information that has been processed?
   Define success for image review. All video? Events only?
   Level of identification: Is someone there? What is someone doing? Facial identification?

5. Text interface: What type? What are the expectations? How many inputs?

6. Audio: Is it legal to record audio at the location? How will it be used?

Text

Text features have been enhanced with Intellex v3.2. The previous version of Intellex allowed you to record, play back and search text. Intellex v3.2 search capabilities allow exception conditions to trigger alarms and search the database. The ability to record text along with video in a digital recorder is still a relatively recent phenomenon. More and more is being asked of the stand-alone digital video recorder.

The basic idea is to take a cash register or ATM data stream and send it to a DVR. The text is recorded along with the video. You can later search for information in the text. This would not be so difficult if there was only one standard data format to contend with. But each different data format must be accounted for individually and there are a lot of different cash registers out there. So far, those who are successful have worked closely with customers to, first, discover what their equipment would send to Intellex and, second, format it correctly for recording. Each customer may have specific ideas about how the text search should be accomplished. So providing text to a single user of a single Intellex may not be a good idea unless they are using a text format that is known to work with the standard Intellex.

ATM interface is another challenge even though there are relatively few ATM protocols compared to cash registers. The security requirements are considerably greater with sensitive bank customer information. Most DVRs connected to ATMs go through a black box from another manufacturer who has the trust of the bank. This box filters the data, passing only the appropriate information to a DVR.

Text Search: Intellex v3.2 provides enhanced text capabilities. You can select exceptions like "void" for every transaction greater than $10. A matching incident can generate an alarm and you could search for results with this information in the database. The previous search string method is still available. This is performed in much the same way you search a word processing file for a particular word or phrase. Want to see the voids that were rung up last night? Just select Search and click on Text Stream (a particular one, or any), type in "void" and you get a list of matches in the text search window. Double click on one and you see the associated video. This is simple and elegant and the visual presentation is easy to follow. With v3.2, you can define exceptions such as the one in our example for every void over $10. A list is generated for all text inputs. This "captured" information simplifies the review process.

Setup: The hardware connection from the text device is through an RS-232 serial port. A single channel of text capability is standard in the premier package. The input to the Intellex is USB. A single channel RS-232 to USB converter is provided with the premier package. Up to four text channels may be accommodated with the addition of a port expander (4 RS-232 ports to USB, RDVEXP01). Software setup is performed in the Setup menu under Text. You give the text input a name, select an available Com port and set up the communication parameters.

Archiving and export: Text will be archived to DAT along with the associated camera. You have the option to export text to a CD-DVD along with the associated camera video (just check the box when exporting). Furthermore, you have the option of downloading text with the associated video to Network Client.

Audio

The ability to record a single channel of audio started with Intellex v2.4. You can listen live at the Intellex and record the audio for later playback along with an associated video input. Audio will record as long as an associated camera is recording, synced together with the video. Recorded audio will be archived to a DAT tape if an optional DAT is used. It may be selected and exported to a CD or downloaded to Network Client along with the associated video. With Intellex v3.2, you can export video, text and audio to a CD along with Intellex Player software that enables you to play it all back on any standard PC. How's that for portability?

Network Client Remote Viewing and Control Software

Network Client is software installed on a PC that allows an end user to retrieve video from Intellex units connected to a network. Network Client will also work in dial-up mode over normal phone lines.

What does Network Client do? Network Client has come a long way since the original version, which was a first step in making video available in a network environment. The intent was to allow the operator to retrieve information stored on the hard drive of Intellex units in other locations. Version 2.2 provides live video in conjunction with Intellex version 2.2 software. The Network Client v2.4 release provides the additional capabilities of dome control (also in v2.3 as an update to v2.2), audio and text in playback, and text search. Network Client v3.0 included multi-screen playback of recorded images. Network Client v3.1 improved remote setup by allowing the operator to control the new features of Intellex v3.1. The following features are available when combining Intellex and Network Client v3.2:

Sites list: Like "favorites," you can rename cameras or Intellex units to something that makes sense to you personally while leaving the original naming scheme intact.

Instrument list: Network Client software allows the operator to manually connect to an Intellex on the network from a list of instruments identified in the instrument setup screen. Intellex units that are wired to the network but not currently running will appear in the instrument list. You can either select an individual Intellex for connection or you can connect to all Intellex units in the list by selecting Actions, then Refresh Instruments.

Intellex status: The operator can review the current status of Intellex on the network. This is the same information provided when you select the status button directly on the Intellex. It shows all the current parameters.

Live video monitoring: With v3.2, you can see live video from any connected Intellex. You can select video from numerous sites for view in different cameos at the same time. This configuration can be saved and later retrieved from a pulldown list.

Receive alarm notification from Intellex: Alarms generated on an Intellex may be "pushed" to a Network Client station. This feature greatly enhances system functionality. The alarm information is provided in an alarm list for later review, or you can respond to alarms as they are received. You will see that an alarm is in progress and even see a live display of the affected camera in a window next to the alarm list. Written instructions may accompany any alarmed camera. You can even get notification when Network Client is minimized or not currently running. An icon on the tool bar will flash and you can select a wave file as an audible alert.

Download alarm list: This allows the operator to retrieve the alarm list from connected Intellex units. You can select the entire list or limit the information to selected cameras. This allows the operator to know that there are alarms present, selected by camera, time and date. Once an alarm is selected for review, the operator is notified of the time required for transfer of the video information.

Download recorded video: This allows the operator to retrieve recorded video, audio and text information from connected Intellex units. The request is by camera number, start and end time. When the clip is selected, the operator is notified of the time required to retrieve the information. The time span may be modified to change the download time. You can begin reviewing the video as soon as the transfer starts. The rest of the file continues to download as you are reviewing the information already received. You can interrupt the download at any time (like, for instance, when you realize that you already have the information you want) and save the portion already downloaded.

Save video: The operator can save the retrieved video or discard it. Saved information is stored in folders generated with the software. The operator may include text notes along with the saved video information, which may also include recorded text and audio.

Enhance video: The same tools screen available in Intellex is included in the Network Client software.

Time synchronization: The Network Client PC may be selected as the master timekeeper for the Intellex and Network Client workstations attached to the network. The time sync can be initiated manually or performed automatically on a daily basis at a specified time.

Remote Smart Search: (Included in the deluxe software package or upgraded with Smart Pack and Remote Pack). You can perform Smart Search remotely with Network Client.

Remote text search: With the premier software package , you can search recorded text remotely with Network Client. Enhanced exception recording is available with Intellex.

System setup: (Included in the deluxe software package or upgraded with Remote Pack). Network Client can remotely set up Intellex.

Bandwidth limiter: You can limit the amount of bandwidth input to Network Client. First select Setup, then click on Bandwidth Configuration. Bandwidth configuration is password-protected.

Q. Once I have a copy of the Network Client software, what prevents me from making multiple copies and using it in several locations?

A. Other than your basic honesty and gnawing conscience, functionality of Network Client software requires installation of a software product code. Could you use the same code on several PCs? You could, but Network Client will not operate properly without an individual key.

Q. Can I have the Intellex operator load a DAT tape, and then retrieve that video information with Network Client?

A. No. Network Client will only retrieve video information from the current database of an Intellex. Once the database information has been deleted or written over, it is no longer available to Network Client. Images restored from a DAT archive are not loaded into the normal storage area of Intellex. However, with v3.x, once uploaded to Intellex, it can now be exported to the CD-RW for better portability.

Q. If I have an Intellex DAT tape, is there any way I can review the information without an Intellex?

A. Yes. Once the video is uploaded to an Intellex, export the desired information to the CD-RW. Using the Intellex Player software on the CD, the video and data can now be viewed on any standard PC.

How Long Will Intellex Record?

"Why can't you tell me exactly how long Intellex will record?" I'd bet you've heard that question before. The answer hasn't changed. There are numerous variables that make it impossible to provide an exact record duration. The biggest variable is our conditional refresh format (see the "JPEG" chapter on page 27 for details); however, there are several other issues that affect the image file size and the resultant record duration.

Competitors who can tell you exactly how long their devices will record can do so because they compress each stored image to exactly the same size. This is true with most JPEG, wavelet and other compression schemes. The amount of compression may vary, producing a high, medium or low quality image depending on the file size of that image. For any given quality, you just divide the file size into the available storage space, factor in the images per second and you have the answer. You could call this a scalable compression capability that allows you to trade off image quality for record duration. The manufacturer may provide a chart showing the record duration for each level of image quality at various record rates. What could be so hard about that? The downside is that the images are large. A reasonably good quality full size image could be in the 25K range. You may get that down to 10K for a not so nice image. Often, a smaller image is used to keep the file size down. Regardless of these factors, a known record duration can be quoted for selected parameters.

When does uncertainty come into the picture? Many manufacturers provide the capability to record normally in one quality, then switch to a lower compression (higher quality image) during alarms. What does this do to that "known" record duration? This alarm-generated switch renders a precise record rate unknowable because you can't predict the number or duration of the alarms that will be triggered. For instance, you may have a continuous alarm like a door propped open that would cause the device to run out of storage sooner than you had anticipated. You may also be able to switch between record rates on alarm. The higher record rate eats up the storage capacity more quickly. This is often an issue with time-lapse VCRs. That 24-hour recording could end in two hours if you switch to two-hour mode on alarm. It's a situation where your intent is to do something good, but the result can prove less than perfect.

In addition to the features mentioned above, we use a proprietary conditional refresh format. We record a full "key frame" at a predictable rate (every 32nd image from each camera). The intervening updates only record the part of the picture that has changed since the last update. With moderate settings, Intellex key frames are in the 20K-25K range. The file size varies with the complexity of the image. The conditional updates could be in the 3K-6K range. The chart below assumes an average file size of 6K. This can vary widely and wildly based on the amount of motion in the image. If you have panning domes, each update could be the size of a key frame because the entire screen changes at each update.

The following chart provides an estimate of record duration based on continuous recording, moderate image movement and normal record settings. This is a good rule of thumb estimate. If you are using the super resolution record mode with moving domes, you may want to cut these times in half. On the other extreme, if you are using event recording only (IntelleCord), the numbers could be much longer. Remember, the bad news is that we can't provide an exact number. The good news is that it is longer than anyone else given the same image capture rate.

Images per second	120 GB storage	240 GB storage	480 GB storage
120ips= 2.4 GB/hr.	50 hrs/2 days	100 hrs/4 days	200 hrs/8 days
60ips = 1.2 GB/hr.	100 hrs/4 days	200 hrs/8 days	400 hrs/16 days
30ips = .6 GB/hr.	200 hrs/8 days	400 hrs/16 days	800 hrs/32 days
15ips = .3 GB/hr.	400 hrs/16 days	800 hrs/32 days	1,600 hrs/64 days
7.5ips = .15 GB/hr.	800 hrs/32 days	1,600 hrs/64 days	3,200 hrs/128 days
2.5ips = .05 GB/hr.	2,400 hrs/100 days	4,800 hrs/192 days	9,600 hrs/384 days
1ips = .02 GB/hr.	6,000 hrs/250 days	12,000 hrs/500 days	24,000 hrs/1000 days

Would you have thought that we could claim a 1,000-day record duration? Although 1ips is not practical for most applications, this is typically the mode used by competitors for quoting their longest record times.

Intellex Evolution

Intellex has come a long way since version 1.2 was first introduced. Version 1.5 provided major improvements in product functionality. Version 2.0 added speed, storage capacity and enhanced features. Version 2.1 provided a major improvement in functionality. The combining of Intellex v2.1 with Network Client v2.0 provided a past, present and future "system solution". From your desktop or laptop, you can view live video from any Intellex on the network. You can change the settings of the Intellex to affect future recording and you can download recorded video from Intellex hard drives. Intellex v2.2 and Network Client v2.2 add even more valuable features. The improvement trend continues with versions 2.3, 2.4, 3.0, 3.1 and now again with v3.2. We have made so many incremental improvements that there isn't enough room to fit all of the versions in the chart below. Version 2.3 was an upgrade to version 2.2, adding one major feature: dome control from Network Client.

Intellex	v1.5	v2.0	v2.1	v2.2 8000	v2.2 16000	v2.4 8000	v2.4 16000
Front panel buttons	Yes	No	No	No	No	No	No
VGA (main) monitor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Composite GUI display	Yes *	Yes	Yes	No	Yes	No	Yes
All monitor outputs active	No		Yes	Yes	Yes	Yes	Yes
Call/spot monitor	No	No	Yes	No	Yes	No	Yes
Processor speed	300Mh	600Mhz	733Mhz	Celeron	866Mhz	Celeron	1.9GHz
Storage capacity	24 GB	38-80 GB	60-80 GB	60-120 GB	80-400 GB	120-480 GB	120-480 GB
Record speed (max)	30/45	60ips	60ips	30ips	60ips	30ips	60ips
Display speed (live)	30/45	60ips	60ips	60ips	60ips	60ips	60ips
Playback VCR controls	No	No	No	Yes	Yes	Yes	Yes
Playback go to feature	No	No	Yes	No	No	No	No
Playback scroll bar	No	No	No	Yes	Yes	Yes	Yes
Touch Tracker compatibility	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Archive to DAT	Yes	Yes	Yes	No	Yes	No	Yes
Archive schedule	No	No	Yes	No	Yes	No	Yes
Export to CD	No	No	No	Yes	Yes	Yes	Yes
Export to DVD	No	No	No	No	No	No	No
Zoom in live video	No	Yes	Yes	No	Yes	Yes	Yes
Zoom in playback video	No	No	Yes	No	Yes	Yes	Yes
Network Client capability	Yes **	Yes	Yes	Yes	Yes	Yes	Yes
Network Client camera control	No	No	No	No	No	Yes	Yes
Software Option Packs	No	No	No	Yes	Yes	Yes	Yes
Bundled versions	No	No	No	No	No	Yes	Yes
Audio (single channel)	No	No	No	No	No	Yes	Yes
Text (record and search)	No	No	No	No	No	Yes	Yes
Advanced text search	No	No	No	No	No	No	No
Database management	No	No	No	No	No	Yes	Yes
Network Client bandwidth throttle	No	No	No	Yes	Yes	Yes	Yes
Operating system	Win95	Win98	Win98se	Win98se	Win98se	Win98se	Win98se
Internal floppy drive	Yes	Yes	Yes	Yes	Yes	No	No
Selectable record rates	No	No	No	No	No	No	No
Activity log	No	No	No	No	No	No	No
Covert camera	No	No	No	No	No	No	No
Advanced motion search	No	No	No	No	No	No	No
Local dome control	No	No	No	No	No	No	No
3rd party switcher control	No	No	No	No	No	No	No

*Live on VGA or composite (not both). ** Must upgrade software to version 1.6.

Intellex	v3.0	v3.0	v3.1	v3.1	v3.2	v3.2
	8000	16000	8000	16000	8000	16000
Front panel buttons	No	No	No	No	No	No
VGA (main) monitor	Yes	Yes	Yes	Yes	Yes	Yes
Composite GUI display	No	Yes	No	Yes	No	Yes
All monitor outs active	Yes	Yes	Yes	Yes	Yes	Yes
Call/spot monitor	No	Yes	No	Yes	No	Yes
Processor speed	Celeron	1.9GHz	1.7GHz	2.0GHz	2.8GHz	2.8GHz
Storage capacity	120-480 GB	120-480GB	120-480GB	120-480GB	250- 500GB	250-750GB
Record speed (max)	60ips	120ips	60ips	120ips	60ips	120ips
Display speed (live)	60ips	60ips	60ips	60ips	60ips	60ips
Playback VCR controls	Yes	Yes	Yes	Yes	Yes	Yes
Playback go to feature	No	No	No	No	No	No
Playback scroll bar	Yes	Yes	Yes	Yes	Yes	Yes
Touch Tracker compatibility	Yes	Yes	Yes	Yes	Yes	Yes
Archive to DAT	No	Yes	No	Yes	No	Yes
Archive schedule	No	Yes	No	Yes	No	Yes
Export to CD	Yes	Yes	Yes	Yes	Yes	Yes
Export to DVD	No	No	No	No	Yes	Yes
Zoom in live video	Yes	Yes	Yes	Yes	Yes	Yes
Zoom in playback video	Yes	Yes	Yes	Yes	Yes	Yes
Network Client capability	Yes	Yes	Yes	Yes	Yes	Yes
Network Client camera control	Yes	Yes	Yes	Yes	Yes	Yes
Software Option Packs	Yes	Yes	Yes	Yes	Yes	Yes
Bundled versions	Yes	Yes	Yes	Yes	Yes	Yes
Audio (single channel)	Yes	Yes	Yes	Yes	Yes	Yes
Text (record and search)	Yes	Yes	Yes	Yes	Yes	Yes
Advanced text search	No	No	Yes	Yes	Yes	Yes
Network Client bandwidth throttle	Yes	Yes	Yes	Yes	Yes	Yes
Database management	Yes	Yes	Yes	Yes	Yes	Yes
Operating system	Win2K	Win2K	Win2K	Win2K	Win2K	Win2K
Internal floppy drive	Yes	Yes	Yes	Yes	Yes	Yes
Selectable record rates	No	No	Yes	Yes	Yes	Yes
Activity log	No	No	Yes	Yes	Yes	Yes
Covert camera	No	No	Yes	Yes	Yes	Yes
Advanced motion search	No	No	Yes	Yes	Yes	Yes
Local dome control	No	No	Yes	Yes	Yes	Yes
3rd party switcher control	No	No	Yes[1]	Yes[1]	Yes[1]	Yes[1]

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[1] Please see "All You Want to Know – Dome Control" for more details

What Options Are Available?

There are two "trim" levels for DV8000 and DV16000: deluxe and premier. The standard software package has been eliminated with v3.2. Each has four internal drive size options: 250 GB, 500 GB or 750 GB. 750 GB only available in rack mount. All you have to consider are the number of cameras, the packaged feature level and the drive size. Can you add options later? Yes.

	DV8000		DV16000	
Hardware:	Deluxe	Premier	Deluxe	Premier
FireWire® card (for ESM)	Yes	Yes	Yes	Yes
56K modem	Yes	Yes	Yes	Yes
Call monitor	No	No	Yes	Yes
Alarms in/out	8	8	16	16
External DAT compatibility	No	No	Yes	Yes
SCSI compatibility (included with external DAT accessory)	No	No	Yes	Yes
CD-ROM	NA	NA	NA	NA
CD-RW	Yes	NA	Yes	NA
DVD	NA	Yes	NA	Yes
Internal 250, 500 or 750 GB	Pick one	Pick one	Pick one	Pick one
Video channels	8	8	16	16
Record max images per second	60	60	120	120
Single channel audio	No	Yes	No	Yes
Single channel text	No	Yes	No	Yes
Software:				
Smart Search (local)	Yes	Yes	Yes	Yes
Remote dome control support	Yes	Yes	Yes	Yes
Remote Smart Search support	Yes	Yes	Yes	Yes
Remote text search support	No	Yes	No	Yes
Remote setup	Yes	Yes	Yes	Yes
Simultaneous live Network Client connections	2	2	5	5
IntelleCord	Yes	Yes	Yes	Yes
Image enhancement tools	Yes	Yes	Yes	Yes
Network Client software (1)	Included	Included	Included	Included
Export to CD-RW or DVD	Yes	Yes	Yes	Yes
320x240 record mode	No	No	Yes	Yes
Covert camera	Yes	Yes	Yes	Yes
Selectable record rates	Yes	Yes	Yes	Yes
Advanced motion search	No	Yes	No	Yes
Advanced text search	No	Yes	No	Yes
Local dome control	Yes	Yes	Yes	Yes
Activity log	Yes	Yes	Yes	Yes
SDLT support	Yes	Yes	Yes	Yes
3rd party switcher support	Yes	Yes	Yes[2]	Yes[2]

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[2] See "All You Want to Know – Dome Control" for more details

Intellex Strengths

There once was a time when Intellex was a groundbreaking product. When it came to digital video management systems, there were few and ours was the best. Now it is hard to keep up with all the products in the market. If you lined them all up and spent a little time with each, you wouldn't have time to do anything else. Given all these competitors and the hard fact that each has at least one major strength, regardless of price, how does Intellex stand out in the crowd?

Let's start with a short list of major features. The major issues are:

1. Video quality (how good does it look in live and playback modes?)
2. Record rate (how many images per second does it record?)
3. Record duration (how long will it maintain recorded information?)
4. Data mining (how hard is it to find something I want?)

Second tier:

1. Remote capability
2. Audio
3. Text
4. Alarm handling

Third tier:

1. Multi-camera playback
2. Individual camera record speeds
3. Individual camera adjustment
4. Covert camera

The Intellex list of wins:

1. Video quality – We are the best, even though this is highly subjective.
2. Record duration – Image size and drive options combine for long record durations.
3. Data mining – Smart Search lets you zero in on the action. Advanced tools widen the gap.
      – Enhanced text search and exception monitoring. Version 3.1 added valuable search an alarm triggering features.
4. Remote capability – You can view live video from multiple Intellex units simultaneously plus search both recorded video and text.
5. Individual camera record speeds – Version 3.1 added camera selectable frame rates.
6. Covert camera – Version 3.1 also added this and an activity log. As fits our style, the way we do these things is flashier and more user friendly than most.
7. Instant replay – Great for attended applications. We are best at this.
8. Look and feel of the system. Although "look and feel" is an intangible, it clearly sets Intellex above the rest. At least for some people. It's like driving a car. A luxury car and a sub-compact will both get you there. One just gets you there. The other lets you enjoy the experience.
9. Another look at the list of a dozen features above shows that Intellex v3.2 addresses them all. The only exception is individual camera adjustment, although we do have individual gain control.